

CLAIMS

What is claimed is:

1. An isolated or recombinant phosphorylated Apoptin or functional equivalent and/or functional fragment thereof.
2. The isolated or recombinant phosphorylated Apoptin of claim 1 or functional equivalent and/or functional fragment thereof wherein said Apoptin is tumor-specifically phosphorylated.
3. The isolated or recombinant phosphorylated Apoptin of claim 1 or claim 2 or functional equivalent and/or functional fragment thereof wherein said isolated or recombinant phosphorylated Apoptin is phosphorylated on a threonine residue of Apoptin, which threonine residue, in the Apoptin of FIG. 1(SEQ ID NO:1), is located between amino acid 100 and amino acid 121 of SEQ ID NO:1.
4. The isolated or recombinant phosphorylated Apoptin of claim 1, claim 2, or claim 3 or functional equivalent and/or functional fragment thereof, wherein said isolated or recombinant phosphorylated Apoptin is phosphorylated on a threonine residue, which threonine residue, in the Apoptin of FIG. 1(SEQ ID NO:1), resides at amino acid position 106 and/or 107 and/or 108 of SEQ ID NO:1.
5. A vector comprising a nucleic acid encoding Apoptin or functional equivalent and/or functional fragment thereof, which Apoptin can be phosphorylated, said vector further comprising:
a nucleic acid molecule encoding a kinase capable of phosphorylating said Apoptin or functional equivalent and/or functional fragment thereof.
6. A gene delivery vehicle comprising the vector of claim 5.

7. A host cell comprising the vector of claim 5 or the gene delivery vehicle of claim 6.
8. An isolated or synthetic antibody or functional equivalent and/or functional fragment thereof specifically recognizing the phosphorylated Apoptin of claim 1, claim 2, claim 3, or claim 4.
9. An immunoassay comprising the antibody of claim 8.
10. A nucleic acid encoding the antibody of claim 8.
11. A vector comprising the nucleic acid of claim 10.
12. A host cell comprising the nucleic acid of claim 10 or the vector of claim 11.
13. Use of Apoptin or functional fragment thereof which can be phosphorylated according to any one of claims 1 to 4 for diagnostic purposes.
14. A method for detecting the presence of cancer cells or cells that are cancer prone in a sample of cells, said method comprising:
- providing a cell lysate of cells from said sample of cells with Apoptin or a functional equivalent and/or functional fragment thereof which Apoptin or a functional equivalent and/or functional fragment thereof can be phosphorylated, and
 - determining phosphorylation state of said Apoptin or a functional equivalent and/or functional fragment thereof.

15. A method for identifying a putative cancer-inducing agent, said method comprising:
submitting a sample of cells to said putative cancer-inducing agent, and
detecting the presence of cancer cells or cells that are cancer prone in a sample of cells by providing a cell lysate of cells from said sample of cells with Apoptin or a functional equivalent and/or functional fragment thereof which Apoptin or a functional equivalent and/or functional fragment thereof can be phosphorylated, and determining the phosphorylation state of said Apoptin or a functional equivalent and/or functional fragment thereof.

16. A method for testing an *in vitro* treatment effect of Apoptin on tumor cells, said method comprising:

providing a cell lysate of tumor cells with Apoptin or functional equivalent and/or functional fragment thereof which can be phosphorylated according to any one of claims 1 to 4; and

determining phosphorylation state of said Apoptin.

17. The method according to claim 14 or claim 16 wherein said Apoptin further comprises a fusion protein.

18. A kit for

a) detecting the presence of cancer cells or cells that are cancer prone, or

b) testing the *in vitro* treatment effect of Apoptin on tumor cells,

said kit comprising the antibody of claim 8.

19. A method for identification of a tumor specific kinase comprising providing Apoptin or functional fragment thereof which can be phosphorylated according to any one of claims 1 to 4.

20. A pharmaceutical composition comprising:
the phosphorylated Apoptin of claim 1, claim 2, claim 3 or claim 4, the vector of claim 5, the gene-delivery vehicle of claim 6, or the host cell of claim 7.
21. The pharmaceutical of claim 20 for the induction of apoptosis.
22. The pharmaceutical of claim 21 wherein said apoptosis is p53-independent.
23. The pharmaceutical composition of claim 20, claim 21, or claim 22 for the treatment of a disease wherein enhanced cell proliferation or decreased cell death is observed.
24. The pharmaceutical composition of claim 23 wherein said disease comprises cancer or auto-immune disease.
25. A method for treating a subject having a disease wherein enhanced cell proliferation or decreased cell death is observed, said method comprising:
treating said subject with the pharmaceutical composition of claim 20, claim 21, claim 22, claim 23, or claim 24.